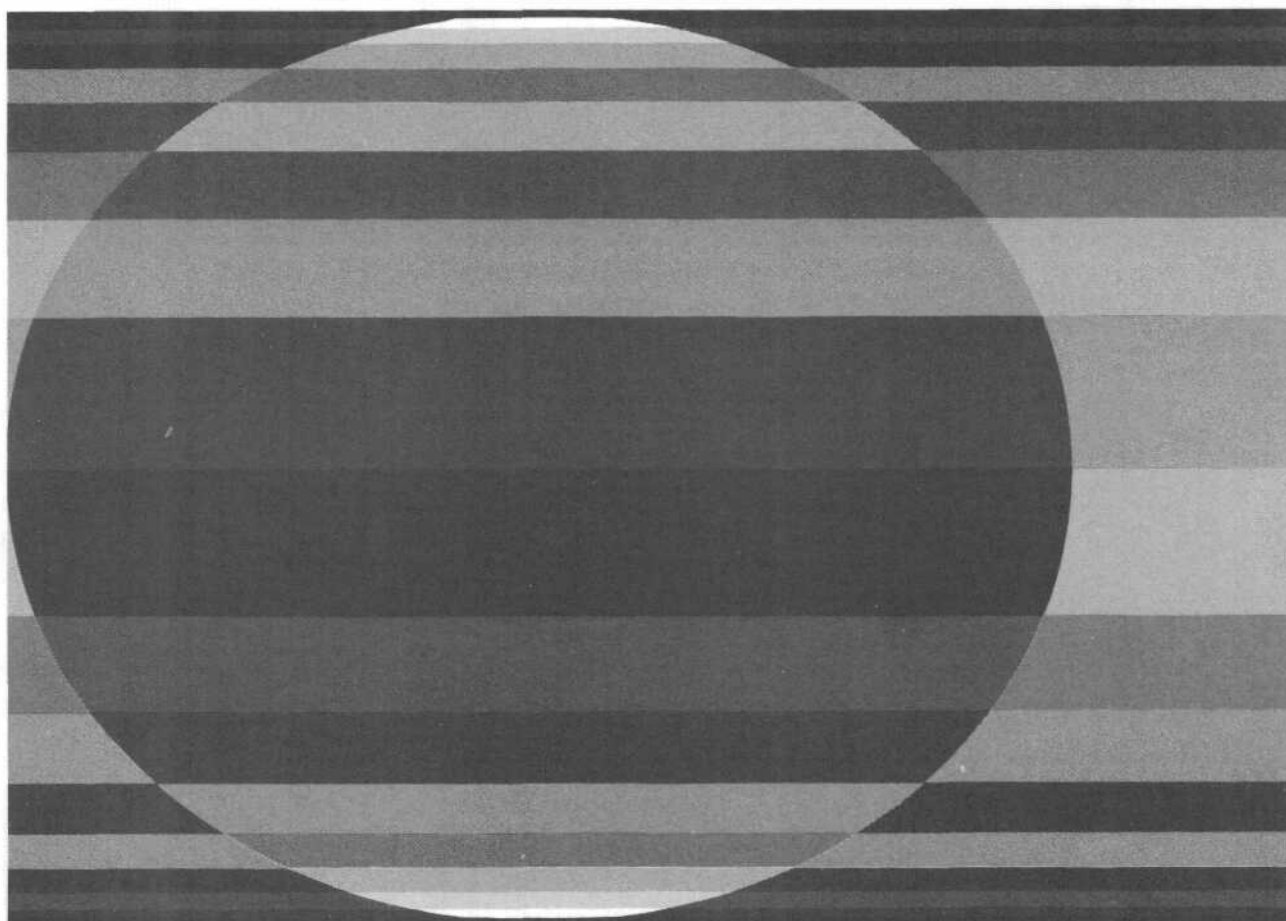


BACKGROUND PAPER

# **U.S. Air and Ground Conventional Forces for NATO: Firepower Issues**

March 1978.



Congress of the United States  
Congressional Budget Office  
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U.S. AIR AND GROUND CONVENTIONAL FORCES FOR NATO:  
FIREPOWER ISSUES

The Congress of the United States  
Congressional Budget Office

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## PREFACE

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The defense budget that the Congress will consider for fiscal year 1979 places a strong emphasis on improving U.S. conventional forces for NATO. The choice of appropriate improvements, however, is tied closely to, and must be viewed in terms of, related capabilities and improvements in the forces of the NATO allies.

This paper examines and compares U.S. and allied firepower capabilities in Central Europe. It discusses several planned and proposed improvements in these capabilities and develops options for U.S. weapons programs. The paper is part of a CBO series on the U.S. military role in NATO, undertaken at the request of the Senate Budget Committee. Other papers in this series are Assessing the NATO/Warsaw Pact Military Balance (December 1977), U.S. Air and Ground Conventional Forces for NATO: Overview (January 1978), and two companion background papers, Air Defense Issues and Mobility and Logistics Issues. In accordance with CBO's mandate to provide objective analysis, this study offers no recommendations.

This paper was prepared by G. Philip Hughes of the National Security and International Affairs Division of the Congressional Budget Office, under the supervision of John E. Koehler and James R. Blaker. The author gratefully acknowledges the contributions of Sheila K. Fifer, Andrew Hamilton, Daniel F. Huck, and of Marion F. Houstoun, who edited the manuscript. Edward A. Swoboda of CBO's Budget Analysis Division provided the cost analysis. Nancy J. Swope prepared the manuscript for publication.

Alice M. Rivlin  
Director

March 1978



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## SUMMARY

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U.S. air and ground conventional firepower assets are procured mainly for the defense of NATO. <sup>1/</sup> Decisions concerning these weapons over the next five years will help shape the roles that U.S. forces play in NATO defenses.

"Firepower," as used here, refers to the capability of conventional air and ground forces to deliver heavy ordnance and explosives against enemy forces near the forward edge of the battle area (the front). The primary weapons providing that capability are either ground-based--artillery, tanks, and antitank guided missiles (ATGMs)--or, in the case of armed helicopters and close air support aircraft, airborne.

The primary function of U.S. conventional ground and tactical air forces in NATO is to defend West Germany, in cooperation with allied forces, against an attack by the Warsaw Pact. In this context, U.S. forces play three roles:

- o The equivalent of five U.S. divisions and their support, based in Europe, defend two of the nine sectors of the NATO Central Front in West Germany (see Figure 1 in Chapter III).
- o U.S. forces can assist the allies in defending other sectors of the front. As a practical matter, European-based U.S. tactical aircraft can respond most rapidly to Pact attacks against allied ground forces.

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<sup>1/</sup> Air defense and mobility and logistics issues--other important aspects of NATO defense--and an overview of the NATO defense problem are discussed in Congressional Budget Office, U.S. Air and Ground Conventional Forces for NATO: Overview, Budget Issue Paper (January 1978) and the companion background papers, Air Defense Issues and Mobility and Logistics Issues.

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- o U.S. forces based outside Western Europe can reinforce U.S. and allied forces in Europe. These reinforcements enable the alliance to respond to an attack too large to be stopped by the forces available in Europe and to sustain combat there until completion of a full NATO mobilization for war.

How effective the United States would be in these roles depends critically on the capabilities of the NATO allies as well as on those of the Warsaw Pact. U.S. forces in southern Germany, for example, compose only about one-fourth of the NATO forces in the Central Region. The remaining three-fourths are made up of forces from Germany, Belgium, Britain, the Netherlands, and France.

Most of the allied forces in northern Germany lack the ground force firepower densities achieved by U.S. divisions. Allied airborne firepower assets probably do not compensate for the firepower deficiencies of their ground forces. And much of their reserve manpower, while numerous, is not organized or equipped to provide prompt reinforcements with strong combat units at any point of attack. The allies plan to improve their firepower capabilities. As the following table suggests, however, significant differences in firepower may remain between the United States and two major allied forces in NATO's Central Region, West Germany and Great Britain. 2/

These differences could be important in the event of conflict. If the Pact decided to attack, it would probably choose the route that appeared to offer the least resistance. U.S. ground forces are located in the south central region of the Central Front, along two of the three major invasion routes. But a more likely invasion route, defended by allied forces, lies in the northern plain of Germany, where the terrain is more favorable to armored forces and where allied firepower may be relatively weaker. If Pact forces succeeded in breaking through allied lines at this point, they would then be in a position to cut supply lines to other, stronger sectors of the front.

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2/ Other allied armies in the Central Region average fewer major weapons per 1,000 men than German and British forces.

DENSITY OF MAJOR WEAPONS IN BRITISH, GERMAN, AND U.S. DIVISIONS:  
NUMBERS OF ARTILLERY PIECES, TANKS, AND ANTITANK WEAPONS PER 1,000  
MEN

	<u>Armored Divisions</u>		<u>Mechanized Divisions</u>	
	Current	Planned	Current	Planned
Great Britain	27.35	39.65	<u>a/</u>	<u>a/</u>
West Germany	27.53	37.87	24.88	38.47
	Current U.S. = 53.15		Current U.S. = 50.69	

SOURCE: Computed from The International Institute for Strategic Studies, The Military Balance, 1977-1978 (London: 1977), pp. 92-93.

a/ Great Britain does not have mechanized divisions in the Central Region.

Decisions on U.S. firepower assets can be made in view of these considerations. The United States has made, and is planning to make, substantial improvements in its firepower capabilities for NATO. Since 1974, these major improvements include creating three new infantry divisions based in the United States; 3/ converting two of five active infantry divisions to mechanized divisions; increasing combat force levels in Europe; increasing inventories of tanks and munitions; and procurement programs for the XM-1 tank, artillery improvements, antitank guided missiles (ATGMs) for ground forces and armed helicopter forces, and the A-10 close air support aircraft. At present, the United States pre-positions the equivalent of two division sets of equipment--two-thirds of three divisions--in Germany, adjacent to the two U.S. sectors (V and VII corps) of the Central Front. Eleven active Army and Marine divisions in the United States are also available to reinforce the Central Region; at present, however, those divisions and their equipment must be sealifted to Europe.

3/ This resulted in a 24-division Army, of which 16 divisions are active and 8 divisions are reserves.



In setting the fiscal year 1979 defense budget, the Congress can continue or change the emphasis and pace of NATO force improvements implied in the current (fiscal year 1978) and other recent defense programs. A wide range of choice is possible.

For example, if the Congress wished to emphasize only the defense of U.S. sectors of the Central Front, it might concentrate on modernizing U.S. forces clearly allocated to that role and consider eliminating forces--particularly late-arriving ground reinforcements--intended primarily to bolster allied defenses. If, on the other hand, the Congress wished to procure forces that could rapidly help defend the allied sectors of the front, it could choose between buying additional attack aircraft, which give prompt but limited firepower support, and the more costly alternative of improving the reinforcement capabilities of U.S. ground forces. Reinforcement ability could be emphasized by pre-positioning more equipment or by buying additional transatlantic and intratheater airlift.

The following options illustrate a range of choice. The first option provides for an increase in U.S. airborne firepower capabilities at a moderate increase in cost. The second option emphasizes a major role for U.S. ground forces as reinforcements to allied forces on the North German plain, at a substantial increase in costs. The third option considers the program and cost implications of a policy that gives primary emphasis to the defense of the two U.S. sectors of the Central Front.

#### OPTION I. PROVIDING FORCES TO AUGMENT ALLIED FIREPOWER CAPABILITIES WITH AIRCRAFT

If the Congress wished to improve the ability, at a moderate cost, of U.S. forces to respond quickly to an attack anywhere along the Central Front, it could increase procurement of airborne firepower assets. The use of U.S. aircraft to delay enemy attacks on allied forces and to destroy enemy tanks and armored vehicles would help U.S. or allied ground forces hold their defensive positions until ground forces could be shifted from other sectors of the front or shipped from the United States. A-10s would be better suited than attack helicopters to the role of assisting allied sectors because of advantages in range, payload, survivability, and ability to operate from allied bases.

The principal disadvantage of this option is that, whereas aircraft can supplement ground forces, they cannot replace them: they can neither deliver the sustained volume of fire as ground forces of equal cost nor hold or take territory.

Should the Congress elect this approach, the following actions would be implied, at a cost of \$2.3 billion more than the fiscal years 1979-1983 defense program: 4/

- o Maintain 24-division Army force structure;
- o Maintain XM-1 tank, Advanced Attack Helicopter (AAH), and Cobra/TOW helicopter production schedules as established in the fiscal year 1979 defense program;
- o Produce the Infantry Fighting Vehicle (IFV), as established in the fiscal year 1978 defense program;
- o Increase A-10 production toward a force goal of nine air wings and develop imaging infrared Maverick missiles to provide a night and adverse-weather combat capability;
- o Accelerate construction of new aircraft shelters in NATO to accommodate the A-10.

#### OPTION II. PROVIDING FORCES TO REINFORCE ALLIED CORPS SECTORS WITH GROUND-BASED FIREPOWER CAPABILITIES

If the Congress believed that allied forces were likely to require large and early reinforcement by U.S. ground forces, and was prepared to increase defense spending substantially, it could approve the introduction of a major U.S. military presence in northern Germany. (A "major U.S. military presence" is understood here to consist of a U.S. corps of three divisions.)

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4/ All options include the Army's plan for production of the IFV, as established in the fiscal year 1978 defense program. Production of the IFV is not, however, included in the Administration's defense program for fiscal years 1979-1983.

■■■■■

Short of adding to the forces now deployed in Europe, this step could best be accomplished by storing heavy equipment in northern Germany for ground forces airlifted from the United States. This option implies increasing procurement of tanks, artillery, and other equipment beyond the levels proposed in the fiscal year 1979 defense budget, which funds the initial costs for pre-positioning one division set of equipment in northern Germany. The additional reinforcement capabilities of U.S. ground forces make close air support aircraft unnecessary; production of those aircraft could thus be held to currently planned levels.

This policy provides greater reinforcement of allied firepower capabilities than Option I. Further, the introduction of a major U.S. military presence in northern Germany could alter Soviet calculations of the likelihood of military success and hence could help deter a conflict. The options' disadvantages are its high cost, the difficulty of securing land for equipment depots, and the possibility that the divisions could be needed for reinforcement of U.S. forces in the south. This option would also significantly expand the U.S. role in NATO, which the Congress might deem unwise; for example, it might lead financially troubled allied governments to postpone needed military improvements.

Should the Congress choose this approach, the following actions would be implied, at a cost of an additional \$3.5 billion above the fiscal years 1979-1983 defense program:

- o Retain a 24-division Army structure;
- o Provide funds in fiscal year 1979 to prepare to double the production rate of the XM-1;
- o Provide funds in fiscal year 1979 to prepare to double the production rate of the IFV;
- o Continue A-10 production toward a goal of seven air wings;
- o Plan to double AAH production at the earliest possible date. 5/

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5/ Since the AAH will not enter production until fiscal year 1983 and since initial production proceeds at the maximum feasible start-up rate, this action would not entail increased program costs during the next five-year period.

- o Fund the costs to pre-position two additional division sets of equipment in Western Europe. 6/

### OPTION III. MODERNIZING SMALLER U.S. NATO FORCES

Alternatively, the Congress may want to reverse the trend toward increased spending on U.S. forces for NATO. It could do so by limiting firepower improvements to those needed to modernize forces intended for use in the two U.S. sectors of NATO's Central Front. The major savings would come from eliminating from the force structure three active divisions based in the United States. Options I and II retained those divisions for use in northern Germany--without pre-positioned equipment in the former case; with it, in the latter. Option III assumes that if no U.S. forces are to be allocated specifically to assist allied sectors, the three divisions would not be required in the force structure.

Option III would be appropriate if the Congress believed that Option I appeared ineffective and Option II looked either too costly or seemed likely to commit the United States to an open-ended posture of compensating for allied shortcomings. Option III would similarly be appropriate if the Congress preferred to direct defense spending increases to capabilities useful outside the context of a Central European land battle or if it preferred to allocate those funds to nondefense parts of the federal budget. One disadvantage of this option is that, with a reduced capability to reinforce at the point of attack, NATO defenses might be more easily breached.

If the Congress elected this course, the fiscal years 1979-1983 defense program could be reduced by \$5.6 billion through the following actions:

- o Delete three active Army divisions;
- o Maintain XM-1, AAH, and Cobra/TOW production schedules as established in the fiscal year 1979 defense program;

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6/ The pre-positioning of additional U.S. equipment in Europe is more fully discussed in the CBO companion background paper, U.S. Air and Ground Conventional Forces for NATO: Mobility and Logistics Issues.



- o Produce the IFV, as established in the fiscal year 1978 defense program;
- o Continue A-10 production toward the currently planned goal of seven air wings.

The following table summarizes the annual costs or savings for each of the options presented above during the five fiscal years 1979-1983. The costs or savings associated with each option are expressed as changes from the fiscal year 1979-1983 defense program proposed by the Department of Defense.

ADDITIONAL COSTS OR SAVINGS OF THREE FIREPOWER APPROACHES COMPARED TO PROJECTED COSTS OF THE FISCAL YEAR 1979 DEFENSE BUDGET: BY FISCAL YEAR, IN MILLIONS OF CURRENT DOLLARS

	1979	1980	1981	1982	1983
Option I (Augmentation Emphasis)	180	190	880	470	620
Option II (Reinforcing Emphasis)	290	340	630	1,150	1,090
Option III (Sector Defense Emphasis)	-160	-720	-1,310	-1,660	-1,770

U.S. procurement programs for conventional ground and tactical air forces are undertaken largely for the defense of NATO. Weapons systems that deliver firepower against enemy ground forces are a major component of both the NATO ground and tactical air forces and U.S. procurement programs. 1/

"Firepower" is used here to mean the ability to deliver heavy ordnance and explosives on enemy forces at, or immediately behind, the forward edge of the battle area (the front). Firepower assets may be either ground-based--artillery, tanks, and antitank guided missiles (ATGMs)--or, in the case of armed helicopters and close air support aircraft, airborne. 2/

In deciding on the level and mix of U.S. firepower procurement programs, the Congress makes decisions concerning the specific roles the United States plays in the defense of NATO. The principal requirement for U.S. conventional ground and tactical air forces is to defend West Germany from a Warsaw Pact attack. Within that context, U.S. forces with firepower assets have three more specific roles. First, U.S. forces stationed in Europe are responsible for the defense of two of the nine sectors of the NATO Central Front, where they provide approximately one-fourth of its forward defense forces (see Figure 1, Chapter III). Second, their more mobile firepower assets (primarily aircraft) provide rapid assistance to allied sectors that are under attack.

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1/ For a discussion of air defense and mobility and logistics issues--other important aspects of NATO defense--and an overview of the NATO defense problem, see Congressional Budget Office, U.S. Air and Ground Conventional Forces for NATO: Overview, Budget Issue Paper (January 1978) and the companion background papers, Air Defense Issues and Mobility and Logistics Issues.

2/ "Firepower," as defined here, excludes some other types of weapons used against enemy ground targets, such as small-arms fire and aerial bombing of deep rear-area targets, since these generally lack either the weight or the immediate impact on the battle that this term connotes.

Finally, U.S. forces located outside Europe--principally in the United States--provide reinforcements for the entire Central Front; some are organized and equipped for early reinforcement of NATO, but most require longer periods of time to respond.

Decisions on the quantity and mix of U.S. firepower procurement programs are consequently decisions on which of these various roles--forward defense of U.S. sectors, prompt firepower assistance to allies, and provision of both early and later reinforcements--the United States wishes to emphasize.

Thus, if the Congress wished to emphasize only the defense of U.S. sectors of NATO's Central Front, it might concentrate on modernizing the U.S. forces clearly allocated to that role and consider cutting forces--particularly late-arriving ground reinforcements--that are intended primarily to bolster allied defenses. If, on the other hand, the Congress wished to provide early firepower assistance to the allied sectors of the front, it could buy additional attack aircraft, which would give prompt but limited firepower support, or it could opt for the alternative of improving the ability of U.S. ground forces stationed outside of Europe to reinforce NATO troops by pre-positioning their equipment in Europe or by buying additional strategic--that is, transatlantic--airlift.

Choices of this nature depend on an assessment not only of costs, but also of the military capabilities of the allies as well as of the Warsaw Pact. Assessment of allied capabilities is necessary because the relationship among NATO forces in the Central Region is such that a weakness in one sector of the front could threaten the defense of the entire front.

The purpose of this paper is to illuminate choices facing the Congress in the fiscal years 1979-1983 defense program by examining a range of U.S. firepower procurement decisions in light of available information on NATO's current firepower assets and planned allied force improvements. Chapter II examines evidence suggesting that NATO forces suffer from firepower deficiencies when compared to the assets of the Warsaw Pact. Chapter III discusses the roles of NATO defense forces in the Central Region and the interdependence of U.S. and allied forces. Chapter IV describes the firepower capabilities and plans of allied forces in Western Europe, while Chapter V examines U.S. firepower programs and issues. Finally, Chapter VI sets out three options that help define the policy choices facing the Congress with respect to firepower procurement programs and the U.S. role in NATO.

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## CHAPTER II. THE FIREPOWER BALANCE IN CENTRAL EUROPE

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Firepower and maneuver are the two essential elements of modern ground combat. Although maneuver brings firepower to bear on enemy targets, it is the application of firepower that destroys those targets.

Ground forces almost certainly can deliver more sustained firepower and destroy enemy armored formations more effectively than close air support forces of equal cost. But they lack the capability of airborne firepower assets to cover long distances quickly to meet an attack or to carry the battle to the enemy.

Firepower assets can also be defined in terms of how quickly they can be brought to bear in the European Central Region. "Immediately available assets" are those attached to active ground and air forces located in Central Europe. 1/ "Early reinforcements" are those ground and air units that can be sent to the Central Region in a few days or a week--for example, allied ready reserve units in Europe, U.S. tactical air squadrons based in the United States, and airlifted U.S. ground forces whose heavy equipment is stored in Europe. "Later reinforcements," such as U.S. ground forces traveling by sea, are those that take weeks to complete the move to Europe.

The United States and its NATO allies appear to be at a numerical disadvantage in immediately available ground force firepower weapons when compared with the Warsaw Pact. But this apparent disparity may be exaggerated by differences in the quality, doctrine, roles, and organization of NATO and Warsaw Pact forces. Whether the overall balance is unfavorable or not, however, Warsaw Pact forces could gain a significant local advantage over NATO by massing for an attack, thus creating a need for quick reinforcements.

As shown in Table 1, the NATO allies face a more than 2 to 1 disadvantage in the number of tanks and cannon artillery

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1/ West Germany, the Benelux countries, East Germany, Poland, and Czechoslovakia.

immediately available in units on the day military mobilization begins in Central Europe. That estimate does not consider the possible contribution of French forces, whose participation in the war is problematical, but even the inclusion of those forces would not appreciably alter the balance. Nor does it consider airborne firepower, where NATO forces may have an edge.

TABLE 1. SELECTED FIREPOWER ASSETS IMMEDIATELY AVAILABLE IN CENTRAL EUROPE, 1977 a/

	Artillery Pieces <u>b/</u>	Medium Tanks	Antitank Guided Missiles
Warsaw Pact	5,800	16,200	4,000
NATO <u>c/</u>	2,600	6,700	3,200

SOURCES: International Institute for Strategic Studies, The Military Balance, 1977-1978 (London: 1977); Western Europe in 1977: Security, Economic, and Political Issues, Hearings before the Subcommittee on Europe and the Middle East, House Committee on International Relations, 95:1 (July/October 1977), pp. 6-16.

a/ Available on the day mobilization begins in fully manned active units in West Germany, the Benelux countries, East Germany, Poland, and Czechoslovakia.

b/ Includes multiple rocket launchers.

c/ Excluding France.

Although the Pact's initial numerical advantage seems to be widely accepted, factors other than numbers of weapons in units also affect the balance of firepower capabilities between NATO and the Warsaw Pact. One such factor is the quality of arms. For example, not only do the Soviets have more artillery, but several of their weapons have greater ranges and rates of fire than NATO

artillery. 2/ On the other hand, almost all NATO artillery in Europe is self-propelled and has some armor plating, making it less vulnerable to enemy fire than the bulk of Soviet artillery, which lacks crew protection. Tanks provide another example. Although the Pact has more tanks, NATO tanks generally have better armor protection, more accurate weapons, and are more lethal at longer ranges.

Doctrine also affects the firepower balance. The Soviets emphasize conducting offensive operations at the earliest possible moment in the conflict, and they stress achieving fire superiority over the enemy. Soviet doctrine for attaining this superiority emphasizes massing large numbers of artillery at the breakthrough point, conducting a prolonged, intense artillery barrage to destroy enemy strongpoints and disrupt enemy control and reinforcement, and then attacking immediately with tanks and motorized infantry along the path prepared by the artillery barrage. 3/ This doctrine for artillery fire and the less sophisticated Pact ammunition make it necessary for the Pact to use large amounts of artillery. These guns deliver an enormous volume of fire on large areas of--rather than particular targets on--the battlefield.

NATO doctrine, on the other hand, emphasizes using artillery to attack particular battlefield targets that threaten ground forces. The superior accuracy and lethality of NATO artillery weapons permit these targets to be destroyed without prolonged, disruptive fire over large areas of the battlefield. Given these different objectives and the ability of NATO artillery to attain them, it is not clear that NATO needs as much artillery as the Pact.

Third, some types of weapons--especially ATGMs--appear particularly suited to defensive operations, while other weapons--especially tanks--are often regarded as more effective for offensive maneuvers. Thus, in assessing Soviet and NATO firepower capabilities, it may be misleading to rely solely on direct

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2/ John Vogt, "Improving NATO Force Capabilities, Atlantic Community Quarterly (Summer 1977), p. 11.

3/ I.N. Voro'byev, "Fire, Assault, Maneuver," in Selected Soviet Military Writings, 1970-1975 (A Soviet View), trans. U.S. Air Force (Washington, D.C.: U.S. Government Printing Office, 1977), p. 220.

comparisons of their tanks, without considering that the defensive advantages of NATO antitank missiles may partially compensate for Soviet advantages in numbers of tanks.

A fourth factor in the firepower balance is the organization of firepower assets. Insofar as is known, the Warsaw Pact's firepower assets are all assigned to military units, which are organized to attack or defend in a depth of two or three ranks or "echelons." Consequently, only a portion of the entire force is directly engaged with enemy forces at any one time. When units of the first echelon have become ineffective through combat losses, they are replaced by units from the second echelon, which take up the fight until they, in turn, need replacement. Units pulled back to the rear are rebuilt and made ready to rejoin the battle. This "unit replacement" approach permits Warsaw Pact forces to engage in continuous ground combat while maintaining a fairly high level of effectiveness.

In contrast, rather than pulling entire units out of the line, NATO ground forces replace combat losses on an individual and continuous basis. Thus, a sizable portion of NATO's assets are retained in maintenance and war reserve stocks, 4/ and these assets are not included in Table 1.

A fifth important factor affecting the firepower balance is mobilization time. The immediate numerical balance of principal firepower assets is unfavorable to NATO. A short mobilization time of 14 days would make the numerical balance even more unfavorable, since the Soviets can deploy forces over land from the Soviet Union faster than the United States can deploy forces from North America. If NATO, however, has more than three weeks' warning of a Pact attack or if forces in Europe are able to sustain combat for a month or so, then reinforcements arriving by sea from the United States would begin to reduce significantly NATO's numerical inferiority in firepower assets.

These factors of quality, weapons mix, doctrine, organization, and available mobilization time clearly affect the balance of firepower capabilities, though it is difficult to assess their precise impact. It is clear, however, that conclusions about NATO firepower capabilities based on numerical comparisons of weapons in units should be qualified to account for these other factors.

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4/ Congressional Budget Office, Assessing the NATO/Warsaw Pact Military Balance, Budget Issue Paper (December 1977), p. 20.

Nevertheless, the availability of such extensive Warsaw Pact ground force firepower assets in Europe, especially when coupled with the emphasis of Soviet military doctrine on offensive operations, 5/ has prompted concern. The concern is heightened by the possibility that a Pact attack on Western Europe could occur with very little warning, could be aimed at rapidly overwhelming NATO defenses in a short, very intense war, and could be conducted initially with forces in Eastern Europe, without reinforcements. These Warsaw Pact forces probably would mass against relatively weak points in NATO's defenses and could achieve large concentrations of force anywhere along the East-West border. Thus, it is possible that--whatever the overall balance--if NATO has little time to mobilize, its firepower capabilities may be inadequate at the point of attack.

Solutions to correct any firepower deficiencies should, therefore, take into account the contributions of each NATO member. In order to assess the effectiveness of possible U.S. contributions to alleviating those deficiencies, the following chapters consider the relationship between U.S. and allied forces and the capabilities and contribution of each for NATO defense.

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5/ A.A. Sidorenko, The Offensive (A Soviet View), trans. U.S. Air Force (Washington, D.C.: U.S. Government Printing Office, 1974), *passim*.



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## CHAPTER III. ROLES OF NATO FORCES

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The principal mission of NATO's Central Region forces is to defend West German territory from an attack across its 700-mile Eastern border. This defense must be conducted as close to that border as possible, and it must prevent any significant penetration by attacking forces: not only do large urban and industrial centers lie close to the border (particularly in the north), but enemy penetration of allied lines in the north could threaten supplies for the entire front. In order to protect the Central Region from forces that could attack anywhere along the front, NATO should distribute its forward forces fairly evenly. But whether or not evenly distributed forward defenses can be attained, it is imperative that NATO be able to reinforce rapidly at the point of attack.

The organization of the Central Region's defenses, however, makes this requirement difficult to achieve. Defense responsibility for the East-West border is assigned by sector to each of the five nations participating in the defense of West Germany. The four sectors that comprise the Northern Army Group (NORTHAG) are manned, respectively, by Dutch, German, British, and Belgian forces. 1/ The four sectors comprising the Central Army Group (CENTAG) are divided between German and U.S. forces (see Figure 1). 2/

Each of the allies in the Central Region plays a largely independent role in NATO's defense. As the economic, demographic, and political circumstances of the NATO countries vary, so do the capabilities of their defense forces. The NATO military and political councils attempt to equalize defense capabilities on the Central Front by adjusting the size of the various sectors

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1/ A fifth sector in the north, on the Baltic coast, is manned by German forces and is under the command of Allied Forces North.

2/ Canadian forces are also assigned to CENTAG. French forces, not under NATO command in wartime, are located to the rear of CENTAG's sectors.

**Figure 1.**  
**Corps Sectors of Military Responsibility in NATO's Central Region**



SOURCE: Adapted from Richard Lawrence and Jeffrey Record, *U.S. Force Structure in NATO* (Washington, D.C.: The Brookings Institution, 1974), p. 31 and also from U.S. Army materials.

a/ NORTHAG (Northern Army Group) and CENTAG (Central Army Group) are two subdivisions of NATO forces in West Germany. The line dividing the two runs from Belgium through West Germany, just south of Bonn, and into East Germany.

and by recommending force improvements. Nevertheless, allied force differences remain in density of firepower weapons, combat supplies, and forces available for reinforcement.

These differences have implications for U.S. policy. Many of NATO's weaker forces--in terms of firepower assets, combat supplies, and reinforcements--are concentrated in NORTHAG. Those sectors lie astride the North German plain--a flat expanse of territory which, despite its increasing urbanization, still offers the most favorable terrain in the NATO Central Front for a Warsaw Pact armored attack. If the allied forces on the northern plain could be overwhelmed, the attack could sever the communication lines from the Benelux ports to U.S. forces in southern Germany, surround U.S. forces, and eventually defeat NATO. If this is the case, it might thus be of questionable value for the United States to strengthen its CENTAG forces, without regard to providing reinforcing capabilities for allied sectors.

Thus, as the United States contemplates efforts to strengthen NATO and improve its firepower capabilities, it should devote special attention to the contributions of its NATO allies. If, despite their continued efforts, their capabilities remain weak, then perhaps the United States should consider whether further efforts to strengthen NATO are appropriate. If, under those circumstances, the United States wished to continue to strengthen NATO, it might prefer to focus on firepower capabilities that could rapidly reinforce allied sectors in Europe rather than on improving U.S. forces in CENTAG. <sup>3/</sup> To examine these choices, it is necessary to describe the allies' current initial firepower and reinforcement capabilities and plans. These can then be compared with U.S. plans to improve capabilities in each type of firepower weapon system.

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<sup>3/</sup> Currently, major new U.S. firepower items, such as XM-1 tanks and Cobra/TOW attack helicopters, are sent to U.S. forces in CENTAG rather than to forces in the United States or to depots of pre-positioned equipment for early-arriving reinforcements. These new equipment items here are referred to as force improvements. Within the last two years, the United States has begun to station an additional brigade, called Brigade 75, in the German sector of NORTHAG. While this action helps strengthen NATO forces outside of CENTAG, it is probably best understood as a redistribution of forces rather than as an improvement in their capabilities.



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## CHAPTER IV. INITIAL FIREPOWER AND REINFORCEMENT CAPABILITIES OF THE NATO ALLIES

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### GROUND-BASED FIREPOWER ASSETS: TANKS AND ARTILLERY

The military capabilities of the NATO allies vary widely. Table 2 demonstrates this with respect to ground-based firepower assets, by comparing the ratios of major weapons to personnel strengths in present U.S., West German, British, and Soviet divisions. (Table 2 excludes corps-level firepower assets, in which the United States has an advantage. Belgian, Canadian, French, and Dutch ground forces together average fewer weapons per 1,000 men than West German forces.)

#### Tanks

The allied forces have fewer main battle tanks than U.S. forces for the same number of troops. The most common NATO tank is the German Leopard I, which is used by Belgium, West Germany, Canada, and the Netherlands. This tank is roughly comparable in performance to the U.S. M60-series tank. The Germans also possess over 1,300 older U.S. M48 tanks. As the Leopard II is introduced into the West German army, the M48s will be transferred to the German territorial forces, and about half will receive new guns and engines. The British army is equipped with some 700 Chieftain tanks, and lesser quantities of older and lighter British, American, and French tanks are also found in the forces of the Central Front allies.

Thus, while the allies' principal tank is qualitatively comparable to that of the United States, the allies have been slower than the United States in replacing the older 1940s- and 1950s-vintage tanks in their standing forces with new equipment. Moreover, all but two of the allies have completed their acquisition of new tanks, and they will neither add nor replace equipment for the next decade or so. Only Belgium and Canada are still completing their purchases of Leopard I tanks, and only the West Germans will purchase a new tank--the Leopard II--that is in any sense comparable to the new U.S. XM-1

TABLE 2. COMPARISON OF NATO AND SOVIET DIVISIONS IN TERMS OF  
MAJOR GROUND-BASED WEAPONS AND PERSONNEL STRENGTH

	United States	West Germany	Great Britain	Soviet Union
<u>Armored Divisions</u>				
Personnel (1,000)	16.5	17.0	11.7	11.0
Tanks	378 <u>a/</u>	300	212 <u>b/</u>	347 <u>c/</u>
Antitank weapons	380	50	72	153
Artillery pieces <u>d/</u>	<u>119</u>	<u>118</u>	<u>36</u>	<u>96</u>
Total Weapons	877	468	320	596
Weapons per 1,000 Men in Divisions	53.15	27.53	27.35	54.18
<u>Mechanized Divisions</u>				
Personnel (1,000)	16.0	17.5	<u>e/</u>	12.7
Tanks	270	250	<u>e/</u>	288 <u>c/</u>
Antitank weapons	426	61	<u>e/</u>	183
Artillery pieces <u>d/</u>	<u>115</u>	<u>124</u>	<u>e/</u>	<u>168</u>
Total Weapons	811	435	<u>e/</u>	639
Weapons per 1,000 Men in Divisions	50.69	24.88	<u>e/</u>	50.31

SOURCE: International Institute for Strategic Studies, The Military Balance, 1977-1978 (London: 1977), pp. 92-93.

a/ Includes 54 light tanks.

b/ Includes 72 light tanks.

c/ Includes 22 light tanks.

d/ Includes heavy mortars and multiple rocket launchers.

e/ Great Britain does not have mechanized divisions in the Central Region.

tank. 1/ Thus, modernization of allied tank forces is likely to lag behind that of the United States in the foreseeable future.

### Artillery

The allies generally have fewer, lighter, and more varied types of artillery pieces than comparable U.S. forces. The British, for example, not only have far less, but also much lighter, artillery than comparable U.S. forces, even after the pending reorganization of their army: 39 light 105 mm. and 155 mm. divisional artillery pieces as compared with 66 heavier and more flexible 155 mm. and 8" howitzers per U.S. division. Similarly, the West German army uses 105 mm. and 155 mm. artillery as corps general-support weapons, while almost every other army uses heavier 8" and 175 mm. weapons, supplemented by 155 mm. howitzers, for that purpose.

The United States and the other NATO allies share the objectives of greater range and improved accuracy, rate of fire, and lethality in future artillery developments. 2/ These features are being incorporated into the Anglo-German-Italian FH-70 155 mm. towed howitzer program, which is now entering service with the the German army; however, that weapon is replacing, rather than augmenting, older artillery pieces. A self-propelled version, the SP-70, which will also be used as a replacement for older guns, is being developed by West Germany, Britain, and

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1/ The British are building for Iran an improved version of the Chieftain tank, incorporating special armor. This tank will also include a 110 mm. gun, which the British believe to be superior to the XM-1 105 mm. gun. Though this improved Chieftain tank may be comparable to the XM-1 in armor protection and armament, it lacks the latter's speed, maneuverability, and "fire-on-the-move" capability. Moreover, because of the size of the Iranian tank order, the British will not be able to produce this tank for their own forces until the early 1980s.

2/ U.S. Department of Defense, Annual Report, Fiscal Year 1977, p. 171; Lt. Col. B.E. Blunt, "Surface-to-Surface Artillery: Developments in the Fire Support for the 1980's," Journal of the Royal United Services Institute for Defense Studies (December 1974), p. 13.

Italy, but it will not be introduced until the mid-1980s. <sup>3/</sup> In addition, Germany is developing a new multiple rocket launcher, the RS-80. The capabilities of this system, however, are apparently more limited than those of a similar U.S. system--the General Support Rocket System--which was under development as of last year.

Finally, as indicated in Table 2, the density of current allied antitank weapons is not nearly as great as that of U.S. weapons. This is particularly true with respect to modern antitank guided missiles (ATGMs), which are considered to be several times as effective as older antitank weapons. The allies have very few ATGMs and are only now beginning to introduce these weapons into their forces and to build up missile stocks. The United States, on the other hand, has fielded these weapons for a number of years and has increased the unit issue of ATGMs on several occasions. The allies, however, are undertaking the greatest number of improvements in this area, with ambitious plans to field hundreds of ATGM launchers and thousands of missiles over the next decade. <sup>4/</sup> Nevertheless, even after completion of that program, the allied forces will still apparently have fewer ATGMs than U.S. forces.

Table 3 compares the ratio of major weapons to manpower in current and planned British and German forces with current U.S. forces. The table suggests that, while the planned improvements will raise the density of weapons in British and German forces (primarily because of new division structures with larger numbers of ATGMs), the improvements will still not bring allied forces up to U.S. levels of firepower capability per 1,000 men. The allies may also be vexed by the supply problems associated with fielding many different national types of ATGMs, including the U.S. TOW, the Franco-German MILAN and HOT, and the British SWINGFIRE. In sum, it seems clear that NATO allied forces are significantly weaker in main ground-based firepower assets than U.S. forces, and European modernization programs apparently will not close this gap in the foreseeable future.

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<sup>3/</sup> Dr. N.J. Hopkins, "A Look Ahead to the Land Warfare Developments of the Mid-Eighties, Part II: Artillery and Air Defense Weapons," Canadian Defense Quarterly (Spring 1977), p. 17.

<sup>4/</sup> See, for example, Rudi Mellor, "Federal Germany's Defense Potential, Part II: The Defense Industry," International Defense Review (June 1974), pp. 336-337.

TABLE 3. DENSITY OF MAJOR WEAPONS IN BRITISH, GERMAN, AND U.S. DIVISIONS: NUMBERS OF ARTILLERY PIECES, TANKS, AND ANTITANK WEAPONS PER 1,000 MEN

	<u>Armored Divisions</u>		<u>Mechanized Divisions</u>	
	Current	Planned	Current	Planned
Great Britain	27.35	39.65	<u>a/</u>	<u>a/</u>
West Germany	27.53	37.87	24.88	38.47
	Current U.S. = 53.15		Current U.S. = 50.69	

SOURCE: Computed from The International Institute for Strategic Studies, The Military Balance, 1977-1978 (London: 1977), pp. 92-93.

a/ Great Britain does not have mechanized divisions in the Central Region.

#### AIRBORNE FIREPOWER ASSETS: ATTACK HELICOPTERS AND CLOSE AIR SUPPORT AIRCRAFT

Airborne firepower, with its ability to concentrate quickly, may partly compensate for deficiencies in ground force firepower, depending on how it is organized and applied. It is clear that the allies and the United States have different approaches to the use of airborne firepower, although it is difficult to say which approach is more effective. Currently, the NATO allies have essentially no specialized attack helicopter forces. They also use multimission aircraft for firepower support of ground troops, while the United States increasingly depends on specialized aircraft for ground attack missions. Finally, the allies generally provide less coordination between ground forces and airborne firepower assets.



### Attack Helicopters

The attack helicopters that the allies have or are planning to acquire soon are multimission utility aircraft to which weapons are temporarily attached. 5/ The French and the British now have small forces of about 250 and 100 light, unarmored, wide-bodied helicopters, respectively, fitted with first-generation French SS-11 ATGMs. 6/ Britain is planning to acquire 100 Lynx utility helicopters by the mid-1980s, probably armed with the U.S. TOW missile, as the mainstay of its future attack helicopter force. 7/ West Germany is also planning to acquire, in two stages, an attack helicopter capability. Between 1979 and 1982, the West German army plans to acquire 227 BO105 light, unarmored, wide-bodied utility helicopters, modified for an attack role and armed with six HOT ATGMs. That will provide one helicopter regiment per German corps. Later, after 1985, West Germany expects to purchase 200 truly specialized attack helicopters, incorporating a narrow silhouette, permanent weapons stations, and a night and all-weather fighting capability. 8/ France may also purchase 100 of

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5/ "European Views on Military Helicopters," Interavia (April 1976), pp. 307-311.

6/ ATGMs are currently distinguished in three generations. For first-generation ATGMs, the operator must keep both the target and the missile in view and steer the missile to the target by remote control. Because of the difficulty of this operation, these weapons require extensive operator training and are easily thwarted by any actions, such as explosions or suppressive fire, which cause the operators to lose track of either the target or the missile. For second-generation ATGMs, such as the U.S. TOW missile, the operator must keep only the target in view, and the missile will automatically be steered to strike the target. For third-generation ATGMs, such as the U.S. Hellfire missile now under development, the operator can launch the missile without ever seeing the target; it will strike the target by following an energy source beamed on the target by a remote observer.

7/ "Helicopter Forces Europe," Flight International (August 6, 1977), p. 415.

8/ Ibid., pp. 414-415; "European Views on Military Helicopters," pp. 309-310.

these aircraft after 1987. The Netherlands and Belgium apparently wish to have very small attack helicopter forces by the early 1980s, but no specific plans have been announced. Table 4 provides a comparison of U.S. and allied helicopter assets.

TABLE 4. NATO HELICOPTER ASSETS

	Attack	Utility
United States	1,000	7,000
Central Region Allies <u>a/</u>	0	1,180

SOURCE: Compiled from International Institute for Strategic Studies, The Military Balance, 1977-1978, pp. 6, 19-22, 24, 26.

a/ Belgium, Britain, Canada, the Netherlands, and West Germany.

The European NATO allies not only lack the number and sophisticated kinds of U.S. attack helicopter assets, but they also plan to use them differently. In contrast to the U.S. practice of attaching some armed helicopters to ground force divisions, the Europeans prefer to use the helicopters as a corps reserve force. The United States would use armed helicopters to harass or delay an attacking force or to reinforce a defensive position from which ground forces had been transferred to meet a threat elsewhere. The allies would prefer to hold their helicopters in reserve and commit them only when an enemy breakthrough could not be stopped by ground forces. Indeed, some allies, notably the British, do not believe in using attack helicopters near the forward edge of the battle area except as a last resort. 9/ Although the allied

9/ "The Soldier's Helicopter," Flight International (June 12, 1976), p. 1560; "Helicopter Forces Europe," p. 413.

approach is undoubtedly in keeping with the small size and light armament of their current helicopter forces, it reduces the potential effect of these forces on the initial battle, where their firepower may well be of greatest value.

#### Close Air Support Aircraft

The allies' close air support capabilities are more extensive than their attack helicopter capabilities, but the rationale behind their choice of weapons is similar. Table 5 indicates that most allies maintain fairly high proportions of their air forces for ground attack missions when compared with the U.S. Air Force. The current and future allied close air support assets are, however, based on multimission aircraft designs that are not optimized for close air support.

TABLE 5. PERCENTAGES OF ALLIED AIR FORCES IN THE NATO CENTRAL REGION ALLOCATED PRIMARILY TO GROUND ATTACK, 1977 a/

	United States	West Germany	Great Britain	The Netherlands	Belgium	France
Percent of Total Air Force	66	83	53	71	71	73

SOURCE: CBO estimates based on figures in International Institute for Strategic Studies, The Military Balance, 1977-1978 (London: 1977) and "World Air Forces 1977," Flight International (July 2, 1977), p. 34.

a/ Counts only fighter, fighter-bomber, and ground attack aircraft.

The United States is increasingly emphasizing the destruction of individual tanks with gun and guided missile fire from slow-flying aircraft operating from behind friendly forces. The allies, by contrast, have chosen not to invest in specialized aircraft for this type of combat; they prefer to deliver scatterable area-type weapons at very high speeds and low altitudes at some distance behind enemy lines, overflying enemy forces and defenses in the process. In addition, unlike the United States, most allies do not stress the role of a Forward Air Controller in coordinating air strikes with ground force operations. <sup>10/</sup> Thus, many of the allies lack both the personnel and the practice required for close coordination of air strikes and ground force operations. Consequently, what the allies call "close air support," the United States would consider "battlefield interdiction"--that is, disrupting enemy troop movements several kilometers behind the forward edge of the battle area, with little coordination between friendly air and ground forces.

In practice, these doctrinal and procedural differences between the United States and the NATO allies in their use of close air support aircraft do not seem to affect significantly the conduct of military operations. Despite the apparent procedural differences, U.S. close air support aircraft can be effectively used to reinforce allied ground forces. Still, if the United States wished to emphasize its ability to provide this kind of flexible air support to the allies, it should strive to better coordinate close air support procedures and doctrine, in order to ensure maximum effectiveness of U.S. support.

#### REINFORCEMENT CAPABILITIES

The preceding discussion focused on firepower assets that the allies could use to meet an initial attack. But the allies' ability to provide additional combat formations to reinforce the front should also be a matter of concern to the Congress in deciding on U.S. forces for NATO. Table 6 reviews published information on the allies' available reserve combat formations. As the table shows, although the allies have a large supply of

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<sup>10/</sup> The West Germans are an exception to this generalization, as they maintain the functional equivalent of Forward Air Controllers in their ground combat units to coordinate close air strikes.

reserve manpower, they have relatively few reserve combat units available for reinforcement of their sectors. These units, many with obsolescent equipment, are manned by reservists. They may be marginally useful in modern high-intensity combat. Even the largest and probably the most effective of these forces--the West German Territorial Army--is spread out across West Germany and is designed primarily for rear-area security rather than for front-line combat. 11/

TABLE 6. ALLIED RESERVE COMBAT UNITS AND RESERVE MANPOWER IN NATO'S CENTRAL REGION

Country	Major Combat Formations	Total Available Reserve Manpower
Belgium	1 mechanized brigade; 1 motorized infantry brigade	50,000
Britain	2 armored reconnaissance regiments	110,000
Germany	6 territorial brigades	504,000 Territorial Army, plus 615,000 Field Army replacements
The Netherlands	1 armored brigade; 2 infantry brigades	145,000

SOURCE: International Institute for Strategic Studies, The Military Balance, 1977-1978 (London: 1977), pp. 19-26.

NOTE: Brigades are customarily one-third of a division.

11/ Five French mechanized divisions, of which two are located in southern Germany and three in northern France, could, in some circumstances, be available as reinforcements. These forces, however, are located at some distance from NORTHAG and, since France withdrew from NATO's military committees, their commitment might not be automatic in the event of war.

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## CHAPTER V. U.S. FIREPOWER CAPABILITIES AND PROGRAMS

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Unlike the allies, the United States maintains large numbers of active, well-armed ground force units and tactical air forces outside the NATO Central Region. Most of these forces are based in the United States, along with reserve tactical air squadrons and eight reserve Army divisions.

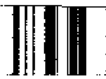
As discussed in Chapter I, U.S. forces play three roles in NATO's Central Region defenses. First, U.S. ground forces stationed in Germany are responsible for the defense of their assigned sectors (the V and VII corps areas), where the equivalent of five U.S. divisions and their support is stationed.

Second, U.S. forces in Germany, particularly aircraft, could assist allied forces in defending other sectors. The ability of U.S. ground forces to provide prompt assistance in defending allied sectors is limited, however, by both the difficulties associated with making relatively long overland journeys close behind the lines and the risk of weakening the defense of U.S. sectors.

Third, forces stationed in the United States are available to reinforce Western Europe. Tactical air force units in the United States can be deployed to Europe in a few days. The United States also maintains the equivalent of two divisions ready for almost immediate deployment by air to Germany, where stocks of weapons and equipment are held for them in CENTAG. Another 11 active divisions--Army and Marine--could be deployed from the United States to Europe by sea with their equipment, <sup>1/</sup> but if a Pact attack were launched on short warning, most would arrive several weeks after hostilities began. Three of these divisions were created in 1974--increasing the overall size of the Army from 21 to 24 divisions--and two are still in the process of being mechanized to make them more effective in the European theater. These increases are associated with a re-estimate of the forces

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<sup>1/</sup> These divisions could be used for other missions, such as the defense of the NATO flanks or for combat elsewhere in the world, but most are clearly earmarked for Europe.



required to defend the NATO Central Region. Since the defense sectors in NORTHAG, manned by allied forces, are evidently more in need of reinforcement than the U.S. sectors in CENTAG, these three additional divisions may be intended to reinforce allied forces in northern Germany.

Each of these three U.S. roles in the defense of NATO's Central Region relies upon different mixes of weapons and equipment and emphasizes different force capabilities. The United States has programs underway to improve its capabilities to perform each role.

#### GROUND-BASED FIREPOWER PROGRAMS: TANKS AND ARTILLERY

##### Tanks

In view of the fact that the U.S. Army is completing a major program to equip its ground units with Dragon and TOW antitank guided missiles (ATGMs), the principal ground-based firepower procurement issues for the fiscal years 1979-1983 period will involve tanks and artillery.

The principal issue in the U.S. tank program is the ultimate size and pace of the program to produce XM-1 tanks. Currently, the United States has an inventory of about 8,000 tanks, <sup>2/</sup> about one-fourth of which are in Europe. The Army's inventory objective is about 15,000 tanks. The pace at which this objective is reached will be determined by the number of tanks produced each year; the costs of achieving that goal will be determined by the kinds of tanks produced.

The United States is currently producing two basic kinds of tanks. The M60A3, at a unit cost of about \$820,000 in fiscal

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<sup>2/</sup> The present inventory of U.S. tanks consists of the M60A1s, about 540 M60A2s (an improved version incorporating a combined tank gun and ATGM launcher), about 1,550 1960s-vintage M60 tanks, and about 1,800 older M48 tanks for the reserve components. In addition, the Army has about 1,500 M551 Sheridan armored reconnaissance vehicles that equip armored cavalry regiments. These use the same gun-missile system as the M60A2. The Sheridans will soon be replaced by M60-series tanks.

year 1979, is an improved version of the standard M60A1 main battle tank. 3/ The XM-1, costing about \$1.5 million each over the life of the program, represents a new generation of tanks. 4/ The Army regards the XM-1 as superior to any tank now in existence or under development--apparently including the West German Leopard II. The principal advantages of the XM-1 are its superior armor protection, greater speed and maneuverability, and its ability to fire accurately while moving. Although M60-series tanks cannot incorporate the special armor of the XM-1 and may lack some of its speed, the improved M60A3 will have roughly the same gun accuracy when stationary but somewhat less accuracy when on the move.

Last year, the approved Army tank program called for procurement of 2,200 new M60A3s (plus conversion of all M60A1s to A3 standards) and 3,312 XM-1 tanks by 1986. This program would not, however, have enabled the Army to reach its tank inventory objective before 1988.

An alternative program, proposed by the Army during preparation of the fiscal year 1979 budget, would double the XM-1 production rate and reduce the conversions of M60A3s, thereby enabling the Army to reach its inventory objective earlier than the previous plan.

The President's fiscal year 1979 defense budget differs substantially from that Army proposal. Though the President's budget would double the XM-1 inventory goal--from 3,312 to 7,058 tanks--it would increase the production rate only slightly, by a total of 419 tanks in fiscal years 1980 and 1981. Consequently, the Army would not reach its inventory objective for XM-1 tanks before the early 1990s.

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3/ In addition to producing M60A3 tanks, the Army plans to upgrade some or all of the 4,140 existing M60A1 tanks to A3 standards. These improvements include a stabilized gun and improved fire-control system for firing on the move, improved night vision equipment, and a more capable engine. The cost is \$340,000 each.

4/ All unit costs represent the total program cost, expressed in current dollars, averaged over the total number of units to be procured.



The Army eventually plans to procure a new armored combat and transport vehicle for mechanized infantry. One candidate now in development is the Infantry Fighting Vehicle (IFV). Last year, the Army planned to buy approximately 3,100 IFVs over a period of seven years, at a cost of \$1.3 billion, with procurement scheduled to begin in fiscal year 1979. The Administration's fiscal year 1979 program, however, includes no funds for procurement of the IFV.

The choice of how many XM-1s and IFVs to procure can be related to choices concerning the U.S. role in NATO. The improvements in firepower and survivability offered by the XM-1 would increase U.S. ground force capabilities in Western Europe. But expenditures for the XM-1 and IFV would improve its ability to provide early reinforcement to the allies only if they were accompanied by expenditures to airlift or pre-position equipment near the allied sectors.

#### Artillery

Like the allies, the United States is planning improvements in the quality, rather than a dramatic increase in the number, of its artillery pieces. The United States, however, appears to be ahead of the allies in the area of specialized munitions, which greatly increase the lethality of artillery weapons.

The United States has an inventory of about 4,450 primary artillery pieces, mostly towed 105 mm. guns for light divisions and 155 mm. and 8" self-propelled guns for armored and mechanized divisions. In view of the recent concern with NATO's firepower deficiencies, a surprisingly small percentage of the U.S. inventory is currently deployed in Europe. The United States plans to purchase 136 155 mm. self-propelled howitzers in fiscal year 1979, at a cost of \$65 million, apparently as part of an ongoing program. In fiscal year 1979, it also plans to deploy in Europe an additional heavy artillery battalion from current inventories, at a cost of about \$4 million, to supplement existing general fire-support capabilities.

The United States is pursuing its objective of increasing the range, volume of fire, and lethality of its artillery through a number of programs, many of which involve only small near-term costs. These include fitting longer gun tubes to existing 155 mm. and 8" howitzers; procuring rocket-assisted projectiles for greater range; developing and procuring improved conventional

munitions that scatter bomblets over wide areas; developing laser-guided artillery shells that can accurately strike tanks and other point targets; and developing improved artillery-locating radars and a computerized fire-support coordination capability (TACFIRE). Finally, as a complement to its cannon artillery, the United States is also developing the General Support Rocket System--a multiple rocket launcher capable of delivering a high volume of fire very rapidly. An accelerated development schedule may make this system available by the early 1980s. The total expected fiscal year 1979 cost of these supporting programs for the artillery will be quite small.

#### AIRBORNE FIREPOWER ASSETS: ATTACK HELICOPTERS AND CLOSE AIR SUPPORT AIRCRAFT

##### Attack Helicopters

The United States was the first country to design a helicopter for the sole purpose of delivering ordnance on battlefield targets, and it now has an inventory of about 712 narrow-bodied, rocket- and machine gun-armed Cobra helicopters, which constitute an integral part of the firepower of almost all U.S. Army divisions. These aircraft are intended to fly close to the ground, using terrain and vegetation to conceal them from enemy view and attack. With the assistance of scout helicopters flying with similar tactics, they locate enemy ground force targets and climb from their concealed positions only long enough to fire weapons at the target before descending and moving on under cover.

The Army is in the midst of a program to convert almost 700 existing Cobra helicopters to carry eight TOW ATGMs by 1981, at a cost of \$1.1 million each, and to procure 305 identically equipped new Cobras, at a cost of \$1.8 million each. This program will provide U.S. forces with a highly mobile antitank capability. With the addition of limited night-vision capability, this anti-tank force will be able to fight in darkness as well.

There are two alleged problems with the Cobra/TOW. First, as a modified aircraft of the Vietnam era, it is said to lack sufficient armor protection for a European battlefield. Second, because the aircraft must emerge from cover for up to 15 seconds in order to visually guide its TOW missile to the target, it is said to be vulnerable to enemy detection and destruction. To alleviate those problems, the Army is developing the Advanced

Attack Helicopter (AAH), of which 536 are to be built between 1981 and 1987, at a cost of \$5.9 million each. The total cost of that program will be about \$4.1 billion. The Cobra/TOW force will complement this fleet.

The AAH will have greater armor protection and redundant controls to improve its chances of surviving if hit. Most importantly, it will fire the Hellfire laser-guided missile, which follows a laser beam--directed on a target by a ground observer, another aircraft, or by the AAH itself--and strikes its target accurately. When the target is designated by a ground observer or another aircraft, the AAH will be able to fire the missile from a completely concealed position, thus reducing its chances of being attacked by the enemy. In addition, the exposure time of the AAH is slightly reduced even when it designates its own targets because Hellfire missiles fly faster than TOW missiles.

Despite these advantages, the AAH system is not without problems. The ground laser designators are, of course, vulnerable to suppressing fire, and they may very well lack adequate time to move into position if an attack came with little warning. The scout helicopters that designate targets for the AAH must expose themselves during the entire missile flight; lacking armor protection or defensive armament, they are as vulnerable to destruction as the Cobra itself. The AAH can, of course, designate targets for its own missiles without the assistance of Scout helicopters, but its resulting exposure vitiates the advantage of the Hellfire missile. If the AAH is struck by one or two bullets--the kind of small-arms threat to aircraft experienced in Vietnam--its armor would protect it. The most severe threat to the attack helicopter in Europe is, however, the Soviet radar-directed ZSU 23 mm. four-barrelled anti-aircraft gun, the SA-7 hand-held anti-aircraft missile, and SA-8 and SA-9 surface-to-air missiles. The ZSU-23 delivers a very high volume of fire; if the AAH is struck by one of its volleys or by one of the anti-aircraft missiles, the helicopter will probably be destroyed.

In addition, the United States has been reluctant to share its laser-seeker and laser-designator Hellfire technology with the NATO allies. Allied laser-designation equipment may not be as sophisticated and refined as U.S. equipment. Thus, although the Europeans will have the laser codes needed to designate for Hellfire and although a NATO standardization agreement ensures that their laser designators and Hellfire are compatible, the qualitative differences between U.S. and European equipment might

weaken Hellfire's performance if used in conjunction with the allies. To avoid that impairment, the AAH would have to designate its own targets--thus reducing, but not eliminating, its survivability advantages over the Cobra/TOW. In sum, the value of many of the features designed to improve the performance of the AAH relative to that of the Cobra/TOW is open to question, especially if it is used to support allied forces.

#### Close Air Support Aircraft

Close air support aircraft constitute a second type of airborne firepower assets. The United States defines close air support as the delivery of air weapons in close coordination with ground force movements, which implies the presence of a Forward Air Controller for coordination. While the United States currently performs close air support with 391 A-7D attack aircraft, supplemented by F-4s and all-weather capable F-111 fighter-bomber aircraft as needed and available, the Air Force is introducing an aircraft designed solely for close air support--the A-10. Procurement of 733 A-10s is planned between 1976 and 1982, at a unit cost of \$6.2 million and a total program cost of \$4.5 billion. The A-10 is designed to be a simple, rugged aircraft with a large weapons capacity and antitank capability. It carries a 30 mm. cannon, which fires armor-piercing ammunition at a very high rate, and as many as six Maverick guided missiles. Because of its large size and slow speed, the aircraft can best survive combat by avoiding enemy air defenses. Its primary tactic is therefore to fly low behind friendly forces, "popping up" only long enough to strike an enemy target with the gun or a missile. Despite some vulnerabilities, the Army and the Air Force believe that the A-10 can survive combat if it uses appropriate tactics and is assisted by other aircraft that attack enemy air defenses.

Although the basing plan for the A-10 is now under review, it is clear that a few squadrons of these aircraft will be permanently deployed in Europe. In the event of a crisis or attack, more could be deployed to Europe within a few days. Once in Europe, these aircraft would be under the command of Allied Air Forces Central Europe, which can order them to fight anywhere they are needed. Thus, they are in principle able to reinforce any allied ground forces with aerial firepower.



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## CHAPTER VI. BUDGET OPTIONS FOR U.S. FIREPOWER PROGRAMS

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In considering the fiscal year 1979 budget, the Congress will make decisions on U.S. conventional ground and tactical air firepower programs that will shape the U.S. roles in NATO during the next five years. The fiscal year 1979 defense program includes funds applicable to each of the three roles that the United States currently plays in the defense of NATO. These roles were described in Chapters I and V.

In deciding upon the fiscal year 1979 budget, the Congress may wish to change the emphasis placed on each role. In doing so, it could also seek to change the costs of U.S. conventional forces firepower programs.

The following pages illustrate a range of choices with respect to U.S. policy toward the allies, U.S. roles in NATO, and firepower program costs. The first option provides for an increase in the capability of the United States to assist the allies with airborne firepower, at a moderate increase in costs. The second option envisions a major role for U.S. ground forces in NORTHAG, at a substantial increase in costs. The third option considers the program and cost implications of a policy that gives primary emphasis to the defense of the two U.S. sectors of the Central Front.

### OPTION I: PROVIDING FORCES TO AUGMENT ALLIED FIREPOWER CAPABILITIES WITH AIRCRAFT

If the Congress wished to improve, at a moderate cost, the ability of U.S. forces to respond quickly to an attack anywhere along the Central Front, it could increase procurement of airborne firepower assets. These assets could be used for the defense of the allied as well as the U.S. sectors. A-10s would be better suited to this role than attack helicopters, given their superior range, payload, and survivability, and their ability to operate from bases in NORTHAG.

Unlike close air support aircraft, U.S. attack helicopters do not have operating bases in allied sectors with ready stocks of ammunition and fuel from which to resupply. In order to



support allied forces, U.S. helicopters would either have to return to U.S. sectors to resupply, which would reduce the number and duration of missions, or they would have to move their supplies with them, which would be a difficult, time-consuming, and expensive undertaking.

The use of U.S. attack helicopters to supplement allied firepower capabilities would also raise coordination problems. U.S. attack helicopters currently operate as an extension of, and in close coordination with, ground forces. The difficulties of achieving close coordination between U.S. helicopters and allied ground forces are, however, exacerbated by the language and procedural differences of the other NATO armies.

The principal constraints on the utility of the A-10 in Europe are its lack of a night and adverse-weather capability, the limited number of aircraft now planned for deployment to Europe, the lower priority of A-10 reinforcements for Europe, and a shortage of aircraft shelters large enough to accommodate the A-10. These constraints become significant when considered in light of the Pact's ability to choose the time and weather in which to attack so as to minimize NATO's capabilities. NATO might need more aerial antitank firepower quickly if there were little warning of attack.

The first problem could be partially alleviated by providing the A-10 with some form of night-combat capability--for instance, by developing an imaging infrared Maverick missile that can be used at night. The problems of deploying more A-10s to Europe are difficult to surmount, since aircraft cannot be indefinitely added to U.S. forces there without compromising the Mutual and Balanced Force Reductions negotiations. Moreover, the United States has a nuclear commitment to NATO, which cannot be maintained by replacing nuclear-capable aircraft with A-10s lacking such a capability. Those problems, however, could be mitigated by increasing both the priority with which A-10s are moved to Europe in time of crisis and the number of shelters available to receive them.

These measures to improve the effectiveness of the A-10 force and supplement U.S. close air support capabilities on the Central Front would be appropriate if the United States believed that the allies required support and if the United States wished to provide it.

The use of U.S. aircraft to delay enemy attacks on allied forces and to destroy enemy tanks and armored vehicles could help the allies hold their defensive positions until ground force reinforcements could be shifted from other sectors of the Central Front or shipped from the United States.

The principal disadvantage of this option is that, while aircraft can supplement ground forces, they cannot substitute for them: they can neither deliver the sustained volume of fire as ground forces of equal cost nor hold or take territory. Those factors make the kind of close air support reinforcement described here a temporary rather than a long-term substitute for critically weakened ground forces.

Should the Congress elect this approach, the following actions would be implied, at a cost of \$2.3 billion more than the fiscal years 1979-1983 defense program: 1/

- o Maintain 24-division Army force structure;
- o Maintain XM-1, AAH, and Cobra/TOW production schedules as established in the fiscal year 1979 defense program;
- o Produce the IFV, as established in the fiscal year 1978 defense program;
- o Increase A-10 production toward a force goal of nine air wings, and develop imaging infrared Maverick missiles to provide a night and adverse-weather combat capability;
- o Accelerate construction of new aircraft shelters in NATO to accommodate the A-10.

Table 7 portrays the additional costs of such an approach over the next five fiscal years.

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1/ All options include the Army's plan for production of the IFV, as established in the fiscal year 1978 defense program. Production of the IFV is not, however, included in the Administration's defense program for fiscal years 1979-1983.

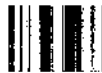


TABLE 7. OPTION I: CHANGES TO FISCAL YEARS 1979-1983 FIVE-YEAR DEFENSE PROGRAM: BY FISCAL YEAR, IN MILLIONS OF CURRENT DOLLARS

	1979	1980	1981	1982	1983
Maintain 24-Division Army	--	--	--	--	--
Maintain XM-1, Cobra/TOW, and AAH Programs at Fiscal Year 1979 Plan	--	--	--	--	--
Fund Production of the IFV	80	90	160	170	180
Add Two Wings of A-10 with Adverse-Weather Capability and Associated Shelters	<u>100</u>	<u>100</u>	<u>720</u>	<u>300</u>	<u>440</u>
Net Change	180	190	880	470	620

OPTION II: PROVIDING FORCES TO REINFORCE ALLIED CORPS SECTORS  
WITH GROUND-BASED FIREPOWER CAPABILITIES

If the Congress believed that the allies were critically weak in firepower and combat capabilities, wished to provide reinforcing capabilities with long-term "staying power," and was prepared to increase defense spending substantially, it could approve the introduction of a major U.S. military presence in NORTHAG.

There are basically two ways in which U.S. ground forces and their firepower assets could be introduced into NORTHAG: lateral transfer from U.S. defense sectors in CENTAG or direct movement from the United States.

Each of these methods has different strengths and weaknesses. Because the large ground troop formations into which tanks, artillery, and antitank firepower assets are integrated lack rapid mobility within a theater of operations, it would take several days or a week to reposition them to fight in a distant area defended by another NATO ally. Moreover, the size of any move would be limited by the need to maintain the defense of U.S. sectors. Movement of whole divisions of ground forces with all or most of their firepower assets from the United States to NORTHAG would be even more time-consuming, unless there were substantial, and very costly, improvements in U.S. airlift capabilities. In the event of a short-warning Warsaw Pact attack, an attempt to reinforce faltering allied forces in Northern Germany by either one or a combination of these methods would be risky.

Increased U.S. investment in tanks and artillery, as now contemplated, would reinforce allied forces in NORTHAG most effectively if these assets were pre-positioned there to equip the earliest arriving U.S. troops. Thus, if the United States believed that the allied forces were likely to require reinforcement and wished to make ground forces available for that purpose, increased spending on tank, artillery, attack helicopter, and ATGM programs and pre-positioning much of this equipment in NORTHAG for the use of reinforcing troops would be appropriate. This pre-positioning would help ensure that U.S. forces could arrive in NORTHAG as quickly as possible and respond effectively to even a short-warning Warsaw Pact attack.

Given the reinforcement capabilities provided by U.S. ground force firepower assets under this option, additional close air support aircraft would not be necessary; production of these aircraft could thus be held to currently planned levels.

The principal advantages of Option II are that it provides greater reinforcement of allied firepower capabilities than Option I. Visible preparations for the introduction of a major U.S. military presence in NORTHAG could alter Soviet calculations of the likelihood of military success, which might help deter an attack. The disadvantages of this option are its high cost, the difficulty of securing land for equipment depots in densely populated northern Germany and the Benelux countries, and the possibility that pre-positioning equipment in NORTHAG could delay reinforcements for CENTAG, should the need arise. In addition, this option would represent a major expansion of the U.S. role in NATO, which the Congress might deem unwise. For



example, there is a danger that U.S. actions to insure allied forces against defeat would reduce the urgency of allied force improvements, making it easier for financially troubled allied governments to postpone needed military improvements.

Should the Congress choose this approach, the following actions would be implied, at a cost of an additional \$3.5 billion more than the fiscal years 1979-1983 five-year program: 2/

- o Retain a 24-division Army structure;
- o Provide funds in fiscal year 1979 to prepare to double the production rate of the XM-1;
- o Provide funds in fiscal year 1979 to prepare to double the production rate of the IFV;
- o Continue A-10 production toward a goal of seven air wings;
- o Plan to double AAH production at the earliest possible date; 3/
- o Fund the costs to pre-position two additional division sets of equipment in NORTHAG. 4/

Table 8 portrays the additional costs of such an approach over the next five fiscal years.

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2/ This option doubles the Army's plan for production of the IFV, as established in the fiscal year 1978 defense program. Production of the IFV is not, however, included in the Administration's defense program for fiscal years 1979-1983.

3/ Since the AAH will not enter production until fiscal year 1983 and since initial production proceeds at the maximum feasible start-up rate, this action would not entail increased program costs during the next five-year period.

4/ The pre-positioning of additional U.S. equipment in Europe is more fully discussed in the CBO companion background paper, U.S. Air and Ground Conventional Forces for NATO: Mobility and Logistics Issues.

TABLE 8. OPTION II: CHANGES TO FISCAL YEARS 1979-1983 FIVE-YEAR DEFENSE PROGRAM: BY FISCAL YEAR, IN MILLIONS OF CURRENT DOLLARS

	1979	1980	1981	1982	1983
Maintain 24-Division Army	--	--	--	--	--
Double XM-1 and AAH Production at Earliest Possible Date	170	210	260	590	630
Double Production of the IFV	120	130	230	310	330
Maintain Seven-Wing A-10 Force Goal	--	--	--	--	--
Preposition Two Additional Division Sets of Equipment in NORTHAG <sup>a/</sup>	--	--	140	250	130
Net Change	290	340	630	1,150	1,090

<sup>a/</sup> The costs of pre-positioning additional division sets of equipment in Europe given here are the same as those in the CBO companion background paper, U.S. Air and Ground Conventional Forces for NATO: Mobility and Logistics Issues. They should only be included once in calculating the cost of overall NATO force options.

### OPTION III. MODERNIZING SMALLER U.S. NATO FORCES

Alternatively, the Congress may wish to reverse the trend toward increased spending on U.S. forces for NATO. It could do so by limiting firepower improvements to those needed to modernize forces intended for use in the two U.S. sectors of the Central Front. The major savings would come from cutting three active divisions based in the United States from the U.S. force structure. These divisions were retained in Options I and II for use in NORTHAG--without pre-positioned equipment in the former case; with it, in the latter. Option III assumes that if no U.S. forces are specifically allocated to NORTHAG, the three U.S. divisions would not be required in the force structure.

Option III could be associated with a policy of limiting increased U.S. defense costs until it is clear what improvements allied governments will make in their forces. This policy could also be an alternative if the Congress felt that the other courses were unacceptable--if, for example, Option I appeared ineffective and Option II either looked too costly or seemed likely to commit the United States to an open-ended posture of compensating for allied shortcomings. The option might be appealing if the Congress simply wished to allocate additional funds to other areas of the defense budget or to nondefense activities without increasing the overall federal budget.

Nevertheless, one disadvantage of this option is that, with a reduced reinforcement capability, NATO's defenses might be more easily breached.

If the Congress elected this course, the fiscal years 1979-1983 defense program could be reduced by \$5.6 billion through the following actions: 5/

- o Delete three active Army divisions;
- o Maintain XM-1, AAH, and Cobra/TOW production schedules as established in the fiscal year 1979 defense program;

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5/ This option includes the Army's plan for production of the IFV, as established in the fiscal year 1978 defense program. Production of the IFV is not, however, included in the Administration's defense program for fiscal years 1979-1983.

- o Produce the IFV, as established in the 1978 defense program;
- o Continue A-10 production toward the currently planned goal of seven air wings.

Table 9 portrays the reductions to the five-year defense program that Option III would entail.

TABLE 9. OPTION III: CHANGES TO FISCAL YEARS 1979-1983 FIVE-YEAR DEFENSE PROGRAM: BY FISCAL YEAR, IN MILLIONS OF CURRENT DOLLARS

	1979	1980	1981	1982	1983
Delete Three Active Army Divisions <u>a/</u>	-240	-810	-1,470	-1,830	-1,950
Maintain XM-1, Cobra/TOW, and AAH Programs at Fiscal Year 1979 Plan	--	--	--	--	--
Fund Production of the IFV	80	90	160	170	180
Maintain Seven-Wing A-10 Force Goal	--	--	--	--	--
Net Change	-160	-720	-1,310	-1,660	-1,770

a/ The savings from deleting three active Army divisions are the same as those in the CBO companion background paper, U.S. Air and Ground Conventional Forces for NATO: Mobility and Logistics Issues. They should be included only once in calculating the cost of overall NATO force options.